CLAIMS

We claim:

1. A method for wafer inspection , comprising: receiving a sample having a first layer that is at least partly conductive and a second, dielectric layer formed over the first layer, following production of contact openings in the second layer;

directing a high current beam of charged particles to simultaneously irradiate a large number of contact openings at multiple locations distributed over an area of the sample;

measuring a specimen current flowing through the first layer in response to irradiation of the large number of contact openings at the multiple locations; and

providing an indication of the at least one defective hole in response to the measurement.

2. The method of claim 1 wherein the large number of holes exceeds one hundred.

3. The method according to claim 1 wherein the steps of directing and measuring are repeated at a very high repetition frequency.

4. The method according to claim 1 wherein the high current beam is characterized by a large cross section and the step of directing comprises compensating for aberrations.

5. The method according to claim 4 wherein the high current beam comprises electrons emitted over a large angular range in relation to an optical axis of the high current beam.

6. The method of claim 1 wherein the step of compensating comprises propagating the high current beam through a long magnetic lens.

7. The method of claim 1 further comprises measuring a secondary electron current emitted from the sample responsive to the high current beam, and wherein the indication is further responsive to the measured secondary electron current.

8. The method of claim 1 wherein the step of providing an indication is followed by a step of locating the at least one defective hole.

9. The method of claim 8 wherein the step of locating comprises directing a high resolution beam towards the at least one defective hole.

10. The method according to claim 1, wherein the contact openings comprise holes.

11. The method according to claim 1, wherein the contact openings comprise trenches.

12. The method of claim 1 wherein area of different directing sessions overlap.

13. The method of claim 1 herein repeating the steps of directing and providing to illuminate multiple areas of the wafer.

14. The method of claim 1 further comprising a step of estimating a signal to noise ratio associated with the high current beam and altering at least one characteristics of the high current beam in response.

15. The method of claim 14 wherein the at least one characteristic is selected from the group consisting of: beam current and spot size.

16. Apparatus for wafer inspection monitoring, comprising:

an electron beam source adapted to direct a high current beam of charged particles to simultaneously irradiate a large number of contact openings at multiple locations distributed over an area of a sample; whereas the sample has a first layer that is at least partly conductive and a second, dielectric layer formed over the first layer, following production of contact openings in the second layer;

current measuring device adapted to measure a specimen current flowing through the first layer in response to irradiation of the large number of contact openings at the multiple locations; and

a controller adapted to provide an indication of the at least defective hole in response to the measurement.

17. The apparatus according to claim 16 further comprising a secondary electron detector, which is adapted to measure a secondary electron current emitted from the sample responsive to the electron beam, and wherein the controller is adapted to create the map so as to indicate the secondary electron current together with the specimen current.

18. The apparatus of claim 16 wherein the large number of holes exceeds one hundred.

19. The apparatus according to claim 16 further adapted to repeat the directing and measuring at a very high repetition frequency.

20. The apparatus according to claim 16 wherein the high current beam is characterized by a large cross section and apparatus comprises aberration compensation means.

21. The apparatus according to claim 20 wherein the high current beam comprises electrons emitted over a large angular range in relation to an optical axis of the high current beam.

22. The apparatus of claim 20 wherein the aberration compensation means comprise a long magnetic lens.

23. The apparatus of claim 16 wherein apparatus is adapted to locate at least one defective hole in response to an indication of an at least one defective hole.

24. The apparatus of claim 23 wherein apparatus is capable of locating by directing a high resolution beam towards the at least one defective hole.

25. The apparatus according to claim 16 wherein the contact openings comprise holes.

26. The apparatus according to claim 16 wherein the contact openings comprise trenches.

27. The apparatus of claim 16 wherein area of different directing sessions overlap.

28. The apparatus of claim 16 wherein the apparatus is adapted to repeat the steps of directing and providing such as to illuminate multiple areas of the wafer.

29. The apparatus of claim 16 further adapted to estimate a signal to noise ratio associated with the high current bean and alter at least one characteristics of the high current beam in response.

30. The apparatus of claim 29 wherein the at least one characteristic is selected from the group consisting of: beam current and spot size.

31. The method according to claim 1 wherein the steps of directing and measuring are repeated until at least a substantial sized portion of the wafer is irradiated by the high current beam.

32. The apparatus according to claim 16 adapted to repeat the steps of directing and measuring are repeated until at least a substantial sized portion of the wafer is irradiated by the high current beam.

33. The method of claim 1 wherein the stage of providing an indication is responsive to previously measured currents.

34. The method of claim 1 wherein the stage of providing an indication is responsive to previously estimated currents.

35. The method of claim 1 wherein the stage of providing an indication comprises applying die to die comparison.

36. The method of claim 1 wherein the stage of providing an indication comprises applying die to golden die comparison.

37. The method of claim 1 wherein the stage of providing an indication comprises applying cell to cell comparison.

38. The apparatus of claim 16 wherein the controller is adapted to provide an indication in response to previously measured currents.

39. The apparatus of claim 16 wherein the controller is adapted to provide an indication in response to previously estimated currents.

40. The apparatus of claim 16 wherein the controller is adapted to provide an indication by applying die to die comparison.

41. The apparatus of claim 16 wherein the controller is adapted to provide an indication by applying die to golden die comparison.

42. The apparatus of claim 16 wherein the controller is adapted to provide an indication by applying cell to cell comparison.